Advance Summary

U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves

1998 Annual Report

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Advance Summary

It was a down year for U.S. proved reserves in 1998, particularly crude oil reserves. U.S. proved reserves of crude oil fell 7 percent in 1998, the largest percentage decline in 53 years. Inflation adjusted crude oil prices, which began a decline in 1997, plunged by December 1998 to levels last seen in 1935. Falling crude prices led to a drop of almost 60 percent in rigs drilling for oil during 1998, followed by a decline in the number of new and producing oil wells, which was followed by the drop in oil reserves. Only 24 percent of 1998 oil production was replaced by proved reserve additions.

As of December 31, 1998 proved reserves were:

Crude Oil (million barrels)	
1997	22,546
1998	21,034
Decrease	-6.7%
Dry Natural Gas (billion cubic feet)	
1997	167,223
1998	164,041
Decrease	-1.9%
Natural Gas Liquids (million barrels)	
1997	7,973
1998	7,524
Decrease	-5.6%

U.S. dry natural gas reserves declined 2 percent in 1998. This decline broke a 4-year string of annual increases, and offset two-thirds of the gain in the prior 4 years. Natural gas reserve additions in 1998 replaced only 83 percent of gas production.

Proved reserves are those quantities that geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. Petroleum engineering and geological judgment are required in estimating proved reserves; therefore, the results are not precise measurements. This report of 1998 U.S. proved reserves of crude oil, natural gas, and natural gas liquids is the 22nd in the annual series prepared by the Energy Information Administration.

Crude Oil

Price matters. Crude oil reserve additions were less than a fifth of those in 1997. Additions would have been even smaller in the absence of a few large, long-term development projects that were continued by their operators in the face of low oil prices. Large revisions associated with property acquisitions and development in some of California's old and heavy oil fields helped that State's reserves to increase.

Changes in proved reserves are impacted by price in several ways. Low prices imply poor economics for oil producers, and poor economics leads to low drilling levels. Only twice in over 100 years have fewer oil wells been drilled than in 1998.

The onshore lower 48 States is a mature exploration and development area where, in the absence of enough exploratory and development wells drilled, it is next to impossible to add sufficient new fields, new reservoirs, and positive revisions to replace production. In the few less mature frontier areas not subject to drilling moratoria, it is still possible to drill very prolific wells that can be profitable even at moderately low prices. But, in 1998, even offshore and Alaskan North Slope projects were canceled or delayed.

Use of the December 1998 oil prices to evaluate oil field economics forced many companies to write down proved reserves in some fields, even in the offshore. The December 1998 price ($8.05 per barrel) was much tougher on smaller and marginal oil well operators as thousands of wells were shut in because they could not meet their direct operating costs, much less turn a profit. As a result, oil production and proved reserves dropped sharply in most lower 48 States areas. Texas' proved oil reserves fell 13 percent in 1998, which for the first time in a decade placed Texas second to Alaska in oil reserves.

In a sharp reversal from several years of increases, oil reserve additions dropped to less than a fifth of those in 1997. Reserve additions are the sum of *total discoveries* and *revisions and adjustments.* For crude oil, *revisions and adjustments* are usually larger than *total discoveries*, but they were a negative 120 million barrels in 1998. This was the first time in 22 years that *revisions and adjustments* did not make a positive contribution to oil reserve additions.

Total discoveries of crude oil were 599 million barrels in 1998, well under the prior 10-year average and less than half those of 1997. The Gulf of Mexico Federal Offshore and Alaska accounted for over 50 percent of them. *Total discoveries*, which equaled only 30 percent of 1998 oil production, are those reserves attributable to field *extensions*, *new field discoveries*, and *new reservoir discoveries in old fields*. They result from drilling exploratory wells.

In a major reversal from 1997, *new field discoveries* were only 152 million barrels, less than a quarter of the 1997 level and well under the prior 10-year average. Most of the new field discoveries were in Alaska and the Gulf of Mexico Federal Offshore. Over half of the proved reserves of oil in the Gulf of Mexico are now located in deep water (water depths greater than 200 meters.)

New reservoir discoveries in old fields were 120 million barrels, about the same as in 1997 but less than the prior 10-year average.

Field *extensions*, down in 1998, added 327 million barrels of proved oil reserves.

Other 1998 crude oil events of note:

The annual average domestic first purchase price for crude oil declined 37 percent for 1998 to $10.88 per barrel.

Exploratory oil completions were down about 30 percent at 303. Total oil well completions were down 32 percent at 7,064.

Total discoveries per exploratory oil well were down 31 percent to an average of 1.98 million barrels per new exploratory well in 1998.

Looking ahead to 1999 on a more positive note for oil production and reserves:

U.S. crude oil prices at the wellhead began increasing in March 1999, reached $20 per barrel in September, and continue to rise. But oil drilling has not rebounded. Nevertheless, higher oil prices in December 1999 will bring back some of the oil reserves that became uneconomic in 1998.

Indicated additional reserves of crude oil decreased 1 percent to 3,160 million barrels in 1998. These are crude oil volumes that may become economically recoverable from known reservoirs through the application of improved recovery techniques using current technology. The presence of large indicated additional reserves in north Alaska, California, Texas, and Louisiana implies that significant upward revisions to crude oil proved reserves can occur in the future.

Natural Gas

The four-year increasing trend for U.S. natural gas proved reserves came to an end in 1998. Lower 48 States dry natural gas reserves also declined about 2 percent from the 1997 level. Even the Gulf of Mexico Federal Offshore proved reserves were down in 1998—dry gas reserves in the Gulf of Mexico Federal Offshore declined 5 percent in 1998. The reserve additions of natural gas were lower in 1998 because *total discoveries* were lower. The other component, *revisions and adjustments* (4,105 billion cubic feet) was about the same as in 1997.

U.S. *total discoveries* of dry gas reserves were 11,433 billion cubic feet in 1998, down 27 percent from 1997.

New field discoveries were 1,074 billion cubic feet, less than half of the new field volume discovered in 1997 and 30 percent less than the prior 10-year average.

Field *extensions* were 8,197 billion cubic feet, down from 1997 but still 19 percent above the prior 10-year average.

New reservoir discoveries in old fields were 2,162 billion cubic feet, down 9 percent from 1997 and 7 percent less than the prior 10-year average.

Coalbed methane reserves and production continued to grow in 1998, despite the decline in reserves and production of conventional natural gas. Coalbed methane reserves accounted for 7 percent of 1998's proved dry gas reserves. Coalbed methane production in 1998 was 6 percent of the U.S. total dry gas production.

Other 1998 natural gas events of note:

Exploratory gas well completions and total gas well completions both increased 7 percent in 1998.

Although the number of wells increased, the average of total discoveries per exploratory gas well was 32 percent less in 1998.

Natural gas prices at the wellhead fell 16 percent in 1998 to an annual average of $1.94 per thousand cubic feet.

U.S. gas production was also down in 1998, in keeping with lower natural gas demand.

Natural Gas Liquids

U.S. natural gas liquids proved reserves decreased 6 percent to 7,524 million barrels in 1998. A reassessment of natural gas liquids reserves in Alaska represents the bulk of the 1998 change. Natural gas liquids reserves are the sum of natural gas plant liquids and lease condensate reserves.

Total proved reserves of liquid hydrocarbons (crude oil plus natural gas liquids) were 28,558 million barrels in 1998, a 6 percent decrease from the 1997 level. Natural gas liquids represented 26 percent of total liquid hydrocarbon proved reserves in 1998.

Data

These estimates are based upon analysis of data from Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," filed by 2,739 operators of oil and gas wells, and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production," filed by operators of 605 active natural gas processing plants. The U.S. proved reserves estimates for crude oil and natural gas are associated with sampling errors of less than 1 percent.

Table 1. Total U.S. Proved Reserves of Crude Oil, Dry Natural Gas, and Natural Gas Liquids, 1988-1998

Year	Adjustments (1)	Revision Increases (2)	Revision Decreases (3)	Revisions[a] and Adjustments (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[b] Discoveries (8)	Production (9)	Proved[c] Reserves 12/31 (10)	Change from Prior Year (11)
	Crude Oil (million barrels of 42 U.S. gallons)										
1988	364	2,684	1,221	1,827	355	71	127	553	2,811	26,825	-431
1989	213	2,698	1,365	1,546	514	112	90	716	2,586	26,501	-324
1990	86	2,483	1,000	1,569	456	98	135	689	2,505	26,254	-247
1991	163	2,097	1,874	386	365	97	92	554	2,512	24,682	-1,572
1992	290	1,804	1,069	1,025	391	8	85	484	2,446	23,745	-937
1993	271	2,011	1,516	766	356	319	110	785	2,339	22,957	-788
1994	189	2,364	1,357	1,196	397	64	111	572	2,268	22,457	-500
1995	122	1,823	795	1,150	500	114	343	957	2,213	22,351	-106
1996	175	1,723	986	912	543	243	141	927	2,173	22,017	-334
1997	520	1,998	1,084	1,434	477	637	119	1,233	2,138	22,546	+529
1998	-638	2,752	2,234	-120	327	152	120	599	1,991	21,034	-1,512
	Dry Natural Gas (billion cubic feet, 14.73 psia, 60° Fahrenheit)										
1988	2,193	23,367	[d]38,427	-12,867	6,803	1,638	1,909	10,350	16,670	[d]168,024	-19,187
1989	3,013	26,673	23,643	6,043	6,339	1,450	2,243	10,032	16,983	167,116	-908
1990	1,557	18,981	13,443	7,095	7,952	2,004	2,412	12,368	17,233	169,346	+2,230
1991	2,960	19,890	15,474	7,376	5,090	848	1,604	7,542	17,202	167,062	-2,284
1992	2,235	18,055	11,962	8,328	4,675	649	1,724	7,048	17,423	165,015	-2,047
1993	972	17,597	12,248	6,321	6,103	899	1,866	8,868	17,789	162,415	-2,600
1994	1,945	21,365	15,881	7,429	6,941	1,894	3,480	12,315	18,322	163,837	+1,422
1995	580	20,465	12,731	8,314	6,843	1,666	2,452	10,961	17,966	165,146	+1,309
1996	3,785	17,132	13,046	7,871	7,757	1,451	3,110	12,318	18,861	166,474	+1,328
1997	-590	21,658	16,756	4,312	10,585	2,681	2,382	15,648	19,211	167,223	+749
1998	-1,635	28,003	22,263	4,105	8,197	1,074	2,162	11,433	18,720	164,041	-3,182
	Natural Gas Liquids (million barrels of 42 U.S. gallons)										
1987	231	847	656	422	213	39	55	307	747	8,147	-18
1988	11	1,168	715	464	268	41	72	381	754	8,238	+91
1989	-277	1,143	1,020	-154	259	83	74	416	731	7,769	-469
1990	-83	827	606	138	299	39	73	411	732	7,586	-183
1991	233	825	695	363	189	25	55	269	754	7,464	-122
1992	225	806	545	486	190	20	64	274	773	7,451	-13
1993	102	764	640	226	245	24	64	333	788	7,222	-229
1994	43	873	676	240	314	54	131	499	791	7,170	-52
1995	192	968	691	469	432	52	67	551	791	7,399	+229
1996	474	844	669	649	451	65	109	625	850	7,823	+424
1997	-15	1,199	910	274	535	114	90	739	864	7,973	+150
1998	-361	1,302	1,094	-153	383	66	88	537	833	7,524	-449

[a]Revisions and adjustments = Col. 1 + Col. 2 - Col. 3.

[b]Total discoveries = Col. 5 + Col. 6 + Col. 7.

[c]Proved reserves = Col. 10 from prior year + Col. 4 + Col. 8 - Col. 9.

[d]An unusually large revision decrease to North Slope dry natural gas reserves was made in 1988. It recognizes some 24.6 trillion cubic feet of downward revisions reported during prior years by operators because of economic and market conditions. The Energy Information Administration (EIA) in previous years carried these reserves in the proved category.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production.” They may differ from the official EIA production data for crude oil, natural gas, and natural gas liquids for 1998 contained in the *Petroleum Supply Annual 1998*, DOE/EIA-0340(98) and the *Natural Gas Annual 1998*, DOE/EIA-0131(98).

Sources: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1988 through 1998 annual reports, DOE/EIA-0216.

Table 2. Crude Oil Proved Reserves, Reserves Changes, and Production, 1998
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Published Proved Reserves 12/31/97	Changes in Reserves During 1998							Proved Reserves 12/31/98
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Production (-)	
Alaska	5,161	1	267	64	28	96	0	437	5,052
Lower 48 States	**17,385**	**-639**	**2,485**	**2,170**	**299**	**56**	**120**	**1,554**	**15,982**
Alabama	47	2	6	9	0	0	0	7	39
Arkansas	45	-1	24	14	0	0	0	7	47
California	3,750	-131	789	336	23	0	18	270	3,843
Coastal Region Onshore	430	-33	62	86	0	0	0	19	354
Los Angeles Basin Onshore	268	-39	19	42	0	0	18	17	207
San Joaquin Basin Onshore	2,871	-58	708	204	23	0	0	213	3,127
State Offshore	181	-1	0	4	0	0	0	21	155
Colorado	198	17	37	21	1	0	0	20	212
Florida	91	-1	0	13	0	0	0	6	71
Illinois	92	-25	56	32	0	0	0	10	81
Indiana	10	-4	12	4	0	0	0	[b]1	[b]13
Kansas	238	28	85	77	5	1	0	34	[b]246
Kentucky	20	9	0	4	0	0	0	2	23
Louisiana	714	-81	180	208	17	3	9	83	551
North	136	11	31	62	3	0	0	18	101
South Onshore	427	-58	139	129	14	2	6	48	353
State Offshore	151	-34	10	17	0	1	3	17	97
Michigan	68	-5	8	19	0	0	0	8	44
Mississippi	183	20	13	65	9	0	0	19	141
Montana	159	-11	30	13	15	1	0	14	167
Nebraska	21	2	4	6	0	0	0	3	18
New Mexico	735	-36	79	126	23	0	4	59	620
East	719	-33	78	123	23	0	4	58	610
West	16	-3	1	3	0	0	0	1	10
North Dakota	279	-29	33	21	16	0	0	33	245
Ohio	43	0	9	6	0	0	0	6	40
Oklahoma	605	-62	207	106	16	1	0	62	599
Pennsylvania	17	-2	1	2	2	0	0	1	15
Texas	5,687	-295	514	621	48	2	9	417	4,927
RRC District 1	83	-18	35	32	1	0	0	8	[b]61
RRC District 2 Onshore	66	-22	16	8	0	0	0	7	45
RRC District 3 Onshore	259	-11	45	56	9	0	0	35	211
RRC District 4 Onshore	70	-23	6	7	0	0	0	6	40
RRC District 5	54	-23	19	8	1	0	5	8	40
RRC District 6	348	-13	19	15	1	0	0	32	308
RRC District 7B	155	-21	16	21	1	0	0	15	115
RRC District 7C	227	-37	19	22	3	1	0	18	173
RRC District 8	2,100	-58	129	192	20	1	3	138	1,865
RRC District 8A	2,098	-40	173	219	10	0	0	127	1,895
RRC District 9	144	-25	21	15	1	0	1	16	111
RRC District 10	79	-1	15	25	1	0	0	[b]7	[b]62
State Offshore	4	-3	1	1	0	0	0	0	1
Utah	234	-9	10	21	1	0	0	14	201
West Virginia	26	0	1	9	0	0	0	1	17
Wyoming	627	-2	46	98	31	1	0	58	547
Federal Offshore	3,477	-22	340	336	92	47	80	417	3,261
Pacific (California)	528	-16	33	42	5	0	5	45	468
Gulf of Mexico (Louisiana)	2,587	15	275	263	84	47	74	336	2,483
Gulf of Mexico (Texas)	362	-21	32	31	3	0	1	36	310
Miscellaneous[a]	19	-1	1	3	0	0	0	2	14
U.S. Total	**22,546**	**-638**	**2,752**	**2,234**	**327**	**152**	**120**	**1,991**	**21,034**

[a]Includes Arizona, Missouri, Nevada, New York, South Dakota, Tennessee, and Virginia.
[b]Indicates the estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.
Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for crude oil for 1998 contained in the *Petroleum Supply Annual 1998*, DOE/EIA-0340(98).
Source: Energy Information Administration, Office of Oil and Gas.

Table 3. Dry Natural Gas Proved Reserves, Reserves Changes, and Production, 1998

(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/97	Changes in Reserves During 1998							Proved Reserves 12/31/98
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Production (-)	
Alaska	10,562	-172	169	125	2	4	0	513	9,927
Lower 48 States	**156,661**	**-1,463**	**27,834**	**22,138**	**8,195**	**1,070**	**2,162**	**18,207**	**154,114**
Alabama	4,968	5	309	313	19	10	0	394	4,604
Arkansas	1,475	-1	596	653	45	0	36	170	1,328
California	2,273	-88	574	328	47	0	12	246	2,244
Coastal Region Onshore	164	-42	44	48	0	0	0	12	106
Los Angeles Basin Onshore	141	-10	39	24	1	0	11	9	149
San Joaquin Basin Onshore	1,912	-44	491	244	46	0	1	217	1,945
State Offshore	56	8	0	12	0	0	0	8	44
Colorado	6,828	-93	1,898	437	361	0	0	676	7,881
Florida	96	-3	0	0	0	0	0	5	88
Kansas	6,989	-265	501	300	23	1	1	548	6,402
Kentucky	1,364	-93	14	41	20	0	21	63	1,222
Louisiana	9,673	-261	2,173	2,034	631	57	311	1,403	9,147
North	3,093	-31	833	725	128	0	0	400	2,898
South Onshore	5,855	-145	1,243	1,199	498	45	276	875	5,698
State Offshore	725	-85	97	110	5	12	35	128	551
Michigan	2,195	105	538	288	12	6	0	240	2,328
Mississippi	582	-19	177	112	109	0	0	79	658
Montana	762	-12	119	43	6	1	0	51	782
New Mexico	15,514	-48	2,040	1,882	805	1	6	1,449	14,987
East	2,642	12	623	439	275	1	6	427	2,693
West	12,872	-60	1,417	1,443	530	0	0	1,022	12,294
New York	224	-26	18	7	0	0	25	16	218
North Dakota	479	-31	47	27	25	0	0	46	447
Ohio	985	-179	276	118	1	0	19	94	890
Oklahoma	13,439	106	2,995	1,997	600	4	42	1,544	13,645
Pennsylvania	1,852	-9	218	114	19	1	4	131	1,840
Texas	37,761	-712	7,584	6,334	3,365	249	526	4,855	37,584
RRC District 1	953	138	174	168	108	7	5	113	1,104
RRC District 2 Onshore	1,634	-97	231	257	184	3	135	219	1,614
RRC District 3 Onshore	4,172	-250	1,079	773	378	43	93	781	3,961
RRC District 4 Onshore	8,099	-353	1,601	1,562	1,705	43	219	1,323	8,429
RRC District 5	1,710	29	689	557	276	17	13	224	1,953
RRC District 6	5,887	-78	1,439	1,019	313	1	0	594	5,949
RRC District 7B	478	-47	28	81	0	124	0	60	442
RRC District 7C	3,407	-108	401	304	70	3	0	356	3,113
RRC District 8	5,397	-133	767	790	121	5	31	541	4,857
RRC District 8A	847	29	100	106	3	0	0	66	807
RRC District 9	794	-5	100	80	26	0	0	101	734
RRC District 10	4,094	141	834	560	179	3	0	418	4,273
State Offshore	289	22	141	77	2	0	30	59	348
Utah	1,839	97	645	110	133	0	0	216	2,388
Virginia	2,446	-495	111	79	45	0	6	61	1,973
West Virginia	2,846	-11	297	180	15	0	71	170	2,868
Wyoming	13,562	-76	1,918	1,774	839	7	12	838	13,650
Federal Offshore[a]	28,466	663	4,770	4,966	1,075	733	1,070	4,909	26,902
Pacific (California)	544	-10	19	43	1	0	6	37	480
Gulf of Mexico (Louisiana)[a]	21,934	598	3,193	3,543	847	583	890	3,728	20,774
Gulf of Mexico (Texas)	5,988	75	1,558	1,380	227	150	174	1,144	5,648
Miscellaneous[b]	43	-17	16	1	0	0	0	3	38
U.S. TOTAL	**167,223**	**-1,635**	**28,003**	**22,263**	**8,197**	**1,074**	**2,162**	**18,720**	**164,041**

[a]Includes Federal offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." They may differ from the official Energy Information Administration production data for natural gas for 1998 contained in the *Natural Gas Annual 1998*, DOE/EIA-0131(98).

Source: Energy Information Administration, Office of Oil and Gas.

Table 4. Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 1998 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/97	Changes in Reserves During 1998							Proved Reserves 12/31/98		
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Production (-)	Total Gas	Non-associated Gas	Associated-Dissolved Gas
Alaska	10,673	-163	170	125	2	4	0	518	10,043	2,768	7,275
Lower 48 States	**165,048**	**-1,461**	**29,231**	**23,294**	**8,628**	**1,112**	**2,240**	**19,104**	**162,400**	**139,015**	**23,385**
Alabama	5,013	4	312	316	19	10	0	399	4,643	4,615	28
Arkansas	1,479	0	597	655	45	0	36	170	1,332	1,294	38
California	2,390	-117	598	345	48	0	13	255	2,332	453	1,879
Coastal Region Onshore	176	-40	49	54	0	0	0	13	118	2	116
Los Angeles Basin Onshore	146	-11	40	25	1	0	12	9	154	1	153
San Joaquin Basin Onshore	2,012	-74	509	254	47	0	1	225	2,016	445	1,571
State Offshore	56	8	0	12	0	0	0	8	44	5	39
Colorado	7,160	-162	2,006	461	366	0	0	701	8,208	7,436	772
Florida	112	0	0	0	0	0	0	6	106	0	106
Kansas	7,328	-120	537	322	24	1	2	588	6,862	6,802	60
Kentucky	1,429	-83	15	43	21	0	23	67	1,295	1,275	20
Louisiana	10,036	-287	2,250	2,105	656	59	326	1,455	9,480	8,569	911
North	3,156	-48	847	736	130	0	0	406	2,943	2,760	183
South Onshore	6,137	-159	1,302	1,255	521	47	289	916	5,966	5,336	630
State Offshore	743	-80	101	114	5	12	37	133	571	473	98
Michigan	2,256	100	552	294	12	6	0	246	2,386	2,158	228
Mississippi	583	-18	178	112	110	0	0	79	662	615	47
Montana	769	-12	120	44	6	1	0	51	789	737	52
New Mexico	16,700	77	2,200	2,067	896	1	7	1,555	16,259	14,816	1,443
East	3,008	-15	703	495	311	1	7	481	3,039	1,694	1,345
West	13,692	92	1,497	1,572	585	0	0	1,074	13,220	13,122	98
New York	224	-26	18	7	0	0	25	16	218	217	1
North Dakota	531	-29	52	30	28	0	0	51	501	240	261
Ohio	985	-178	276	118	1	0	19	95	890	548	342
Oklahoma	14,311	99	3,187	2,125	638	5	44	1,642	14,517	13,321	1,196
Pennsylvania	1,861	-11	219	115	20	1	4	131	1,848	1,769	79
Texas	41,108	-790	8,150	6,824	3,561	273	557	5,242	40,793	33,429	7,364
RRC District 1	1,018	120	181	175	113	7	5	117	1,152	1,101	51
RRC District 2 Onshore	1,732	-93	246	274	196	3	144	234	1,720	1,516	204
RRC District 3 Onshore	4,418	-256	1,145	820	402	45	100	829	4,205	3,275	930
RRC District 4 Onshore	8,483	-371	1,676	1,636	1,784	45	229	1,386	8,824	8,430	394
RRC District 5	1,749	26	704	568	282	17	13	228	1,995	1,906	89
RRC District 6	6,194	-73	1,517	1,074	331	1	1	626	6,271	5,691	580
RRC District 7B	559	-62	33	94	0	143	0	69	510	306	204
RRC District 7C	3,843	-139	450	341	79	4	0	400	3,496	2,939	557
RRC District 8	6,030	-15	875	902	137	5	35	618	5,547	2,727	2,820
RRC District 8A	1,247	-35	137	147	5	0	0	92	1,115	18	1,097
RRC District 9	932	-5	118	93	31	0	0	119	864	665	199
RRC District 10	4,613	90	926	622	199	3	0	465	4,744	4,510	234
State Offshore	290	23	142	78	2	0	30	59	350	345	5
Utah	2,005	29	674	117	139	0	0	228	2,502	2,293	209
Virginia	2,446	-495	111	79	45	0	6	61	1,973	1,973	0
West Virginia	2,946	-12	307	186	16	0	73	176	2,968	2,925	43
Wyoming	14,321	-104	2,006	1,869	880	7	13	883	14,371	13,577	794
Federal Offshore[a]	29,011	691	4,850	5,059	1,097	748	1,092	5,004	27,426	19,931	7,495
Pacific (California)	556	-12	19	44	1	0	6	37	489	52	437
Gulf of Mexico (Louisiana)[a]	22,428	637	3,265	3,629	868	598	911	3,817	21,261	15,427	5,834
Gulf of Mexico (Texas)	6,027	66	1,566	1,386	228	150	175	1,150	5,676	4,452	1,224
Miscellaneous	44	-17	16	1	0	0	0	3	39	22	17
U.S. Total	**175,721**	**-1,624**	**29,401**	**23,419**	**8,630**	**1,116**	**2,240**	**19,622**	**172,443**	**141,783**	**30,660**

[a]Includes Federal offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Note: The production estimates in this table are based on data reported on Form EIA-23. They may differ from the official Energy Information Administration production data for natural gas for 1998 contained in the *Natural Gas Annual 1998,* DOE/EIA-0131(98).

Source: Energy Information Administration, Office of Oil and Gas.

Table 5. Nonassociated Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 1998 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/97	Changes in Reserves During 1998							Proved Reserves 12/31/98
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Production (-)	
Alaska	2,957	-14	105	77	1	0	0	204	2,768
Lower 48 States	**140,382**	**-904**	**24,291**	**19,405**	**7,902**	**1,009**	**2,022**	**16,282**	**139,015**
Alabama	4,983	1	301	308	19	10	0	391	4,615
Arkansas	1,423	3	582	638	45	0	36	157	1,294
California	570	-43	73	102	5	0	1	51	453
Coastal Region Onshore	47	-46	1	0	0	0	0	0	2
Los Angeles Basin Onshore	3	0	0	3	1	0	0	0	1
San Joaquin Basin Onshore	518	-1	72	99	4	0	1	50	445
State Offshore	2	4	0	0	0	0	0	1	5
Colorado	6,627	-159	1,658	404	361	0	0	647	7,436
Florida	0	0	0	0	0	0	0	0	0
Kansas	7,277	-118	509	313	21	1	2	577	6,802
Kentucky	1,403	-82	15	40	21	0	23	65	1,275
Louisiana	9,020	-278	1,868	1,718	621	43	298	1,285	8,569
North	2,869	-129	774	525	116	0	0	345	2,760
South Onshore	5,538	-91	1,010	1,094	500	36	264	827	5,336
State Offshore	613	-58	84	99	5	7	34	113	473
Michigan	1,975	94	506	218	10	6	0	215	2,158
Mississippi	532	-12	157	100	110	0	0	72	615
Montana	727	-13	106	37	0	0	0	46	737
New Mexico	15,280	57	1,824	1,818	809	1	2	1,339	14,816
East	1,694	-3	340	290	225	1	2	275	1,694
West	13,586	60	1,484	1,528	584	0	0	1,064	13,122
New York	223	-26	18	7	0	0	25	16	217
North Dakota	274	-17	10	10	0	0	0	17	240
Ohio	594	-164	221	78	1	0	16	42	548
Oklahoma	13,296	-27	2,808	1,899	603	5	41	1,506	13,321
Pennsylvania	1,769	-2	213	105	12	1	4	123	1,769
Texas	33,322	-739	6,783	5,672	3,337	268	526	4,396	33,429
RRC District 1	950	114	173	151	113	7	5	110	1,101
RRC District 2 Onshore	1,497	-72	220	257	191	3	144	210	1,516
RRC District 3 Onshore	3,539	-211	816	727	354	43	97	636	3,275
RRC District 4 Onshore	8,115	-357	1,584	1,616	1,734	45	229	1,304	8,430
RRC District 5	1,681	40	657	563	282	17	9	217	1,906
RRC District 6	5,616	-127	1,465	994	323	1	1	594	5,691
RRC District 7B	299	-35	14	69	0	143	0	46	306
RRC District 7C	3,247	-126	339	264	70	2	0	329	2,939
RRC District 8	2,886	-38	486	317	44	4	11	349	2,727
RRC District 8A	41	-28	16	3	0	0	0	8	18
RRC District 9	785	-4	34	84	29	0	0	95	665
RRC District 10	4,386	81	841	557	195	3	0	439	4,510
State Offshore	280	24	138	70	2	0	30	59	345
Utah	1,695	31	664	31	138	0	0	204	2,293
Virginia	1,923	28	111	79	45	0	6	61	1,973
West Virginia	2,887	-8	305	176	16	0	73	172	2,925
Wyoming	13,471	-133	1,930	1,739	832	1	8	793	13,577
Federal Offshore[a]	21,098	698	3,623	3,913	896	673	961	4,105	19,931
Pacific (California)	58	0	1	6	0	0	1	2	52
Gulf of Mexico (Louisiana)[a]	16,241	533	2,479	2,762	681	523	786	3,054	15,427
Gulf of Mexico (Texas)	4,799	165	1,143	1,145	215	150	174	1,049	4,452
Miscellaneous[b]	13	5	6	0	0	0	0	2	22
U.S. Total	**143,339**	**-918**	**24,396**	**19,482**	**7,903**	**1,009**	**2,022**	**16,486**	**141,783**

[a]Includes Federal offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for natural gas for 1998 contained in the *Natural Gas Annual 1998*, DOE/EIA-0131(98).

Source: Energy Information Administration, Office of Oil and Gas.

Table 6. Associated-Dissolved Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 1998 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/97	Changes in Reserves During 1998							Proved Reserves 12/31/98
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Extensions (+)	New Field Dis coveries (+)	New Reservoir Discoveries in Old Fields (+)	Production (-)	
Alaska	7,716	-149	65	48	1	4	0	314	7,275
Lower 48 States	**24,666**	**-557**	**4,940**	**3,889**	**726**	**103**	**218**	**2,822**	**23,385**
Alabama	30	3	11	8	0	0	0	8	28
Arkansas	56	-3	15	17	0	0	0	13	38
California	1,820	-74	525	243	43	0	12	204	1,879
Coastal Region Onshore	129	6	48	54	0	0	0	13	116
Los Angeles Basin Onshore	143	-11	40	22	0	0	12	9	153
San Joaquin Basin Onshore	1,494	-73	437	155	43	0	0	175	1,571
State Offshore	54	4	0	12	0	0	0	7	39
Colorado	533	-3	348	57	5	0	0	54	772
Florida	112	0	0	0	0	0	0	6	106
Kansas	51	-2	28	9	3	0	0	11	60
Kentucky	26	-1	0	3	0	0	0	2	20
Louisiana	1,016	-9	382	387	35	16	28	170	911
North	287	81	73	211	14	0	0	61	183
South Onshore	599	-68	292	161	21	11	25	89	630
State Offshore	130	-22	17	15	0	5	3	20	98
Michigan	281	6	46	76	2	0	0	31	228
Mississippi	51	-6	21	12	0	0	0	7	47
Montana	42	1	14	7	6	1	0	5	52
New Mexico	1,420	20	376	249	87	0	5	216	1,443
East	1,314	-12	363	205	86	0	5	206	1,345
West	106	32	13	44	1	0	0	10	98
New York	1	0	0	0	0	0	0	0	1
North Dakota	257	-12	42	20	28	0	0	34	261
Ohio	391	-14	55	40	0	0	3	53	342
Oklahoma	1,015	126	379	226	35	0	3	136	1,196
Pennsylvania	92	-9	6	10	8	0	0	8	79
Texas	7,786	-51	1,367	1,152	224	5	31	846	7,364
RRC District 1	68	6	8	24	0	0	0	7	51
RRC District 2 Onshore	235	-21	26	17	5	0	0	24	204
RRC District 3 Onshore	879	-45	329	93	48	2	3	193	930
RRC District 4 Onshore	368	-14	92	20	50	0	0	82	394
RRC District 5	68	-14	47	5	0	0	4	11	89
RC District 6	578	54	52	80	8	0	0	32	580
RRC District 7B	260	-27	19	25	0	0	0	23	204
RRC District 7C	596	-13	111	77	9	2	0	71	557
RRC District 8	3,144	23	389	585	93	1	24	269	2,820
RRC District 8A	1,206	-7	121	144	5	0	0	84	1,097
RRC District 9	147	-1	84	9	2	0	0	24	199
RRC District 10	227	9	85	65	4	0	0	26	234
State Offshore	10	-1	4	8	0	0	0	0	5
Utah	310	-2	10	86	1	0	0	24	209
Virginia	523	-523	0	0	0	0	0	0	0
West Virginia	59	-4	2	10	0	0	0	4	43
Wyoming	850	29	76	130	48	6	5	90	794
Federal Offshore[a]	7,913	-7	1,227	1,146	201	75	131	899	7,495
Pacific (California)	498	-12	18	38	1	0	5	35	437
Gulf of Mexico (Louisiana)[a]	6,187	104	786	867	187	75	125	763	5,834
Gulf of Mexico (Texas)	1,228	-99	423	241	13	0	1	101	1,224
Miscellaneous[b]	31	-22	10	1	0	0	0	1	17
U.S. Total	**32,382**	**-706**	**5,005**	**3,937**	**727**	**107**	**218**	**3,136**	**30,660**

[a]Includes Federal offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for natural gas for 1998 contained in the *Natural Gas Annual 1998*, DOE/EIA-0131(98).

Source: Energy Information Administration, Office of Oil and Gas.

Table 7. Natural Gas Liquids Proved Reserves, Reserves Changes, and Production, 1998
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Published Proved Reserves 12/31/97	Changes in Reserves During 1998							Proved Reserves 12/31/98
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Production (-)	
Alaska	631	-287	1	1	0	0	0	24	320
Lower 48 States	**7,342**	**-74**	**1,301**	**1,093**	**383**	**66**	**88**	**809**	**7,204**
Alabama	93	0	4	8	0	0	0	8	81
Arkansas	7	0	1	3	0	0	0	0	5
California	95	-20	20	17	1	0	0	7	72
Coastal Region Onshore	9	1	4	4	0	0	0	1	9
Los Angeles Basin Onshore	4	1	1	1	0	0	0	0	5
San Joaquin Basin Onshore	82	-22	15	12	1	0	0	6	58
State Offshore	0	0	0	0	0	0	0	0	0
Colorado	264	-54	86	20	4	0	0	20	260
Florida	17	2	0	0	0	0	0	1	18
Kansas	271	81	27	18	1	0	0	28	334
Kentucky	48	8	1	2	1	0	1	3	54
Louisiana	437	-36	103	85	33	7	18	66	411
North	80	-24	22	15	2	0	0	8	57
South Onshore	333	-12	69	66	31	6	17	53	325
State Offshore	24	0	12	4	0	1	1	5	29
Michigan	50	-1	13	7	0	1	0	5	51
Mississippi	6	4	2	4	1	0	0	1	8
Montana	5	-1	1	0	0	0	0	0	5
New Mexico	869	84	121	135	68	0	1	79	929
East	273	-18	63	43	28	0	1	42	262
West	596	102	58	92	40	0	0	37	667
North Dakota	47	1	4	2	2	0	0	4	48
Oklahoma	685	1	166	109	32	0	2	79	698
Texas	2,687	-90	479	425	163	21	25	316	2,544
RRC District 1	54	-15	6	6	3	0	0	4	38
RRC District 2 Onshore	87	-1	13	15	9	0	6	14	85
RRC District 3 Onshore	286	-18	64	66	20	3	6	49	246
RRC District 4 Onshore	347	-17	75	69	71	2	10	56	363
RRC District 5	35	-4	13	10	5	0	0	4	35
RRC District 6	260	7	72	51	16	0	0	28	276
RRC District 7B	59	-11	3	10	0	16	0	6	51
RRC District 7C	327	-27	38	29	7	0	0	34	282
RRC District 8	459	72	79	80	13	0	3	55	491
RRC District 8A	290	-44	28	30	1	0	0	19	226
RRC District 9	98	2	13	10	3	0	0	13	93
RRC District 10	382	-32	71	48	15	0	0	34	354
State Offshore	3	-2	4	1	0	0	0	0	4
Utah and Wyoming	761	-85	99	91	39	0	0	48	675
West Virginia	71	0	7	4	0	0	2	4	72
Federal Offshore[a]	920	35	165	163	38	37	39	140	931
Pacific (California)	14	0	0	1	0	0	0	1	12
Gulf of Mexico (Louisiana)[a]	785	17	132	130	31	34	27	120	776
Gulf of Mexico (Texas)	121	18	33	32	7	3	12	19	143
Miscellaneous[b]	9	-3	2	0	0	0	0	0	8
U.S. TOTAL	**7,973**	**-361**	**1,302**	**1,094**	**383**	**66**	**88**	**833**	**7,524**

[a]Includes Federal offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, New York, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, and Virginia.

Note: The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production.” They may differ from the official Energy Information Administration production data for natural gas and natural gas liquids for 1998 contained in the publications *Petroleum Supply Annual 1998,* DOE/EIA-0340(98) and *Natural Gas Annual 1998,* DOE/EIA-0131(98).

Source: Energy Information Administration, Office of Oil and Gas.

Table 8. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-1998

Year	Gulf of Mexico			Depth		Deepwater Percentage[b]
	Total	Louisiana[a]	Texas	Greater than 200 meters[b]	Less than 200 meters[b]	
	Crude Oil (million barrels of 42 U.S. gallons)					
Production						
1992	267	253	14	46	221	17.2
1993	266	252	14	46	220	17.3
1994	265	245	20	53	212	20.1
1995	292	262	30	77	215	26.4
1996	303	265	38	90	213	29.7
1997	342	298	44	123	219	36.0
1998	372	336	36	171	201	46.0
Reserves						
1992	1,835	1,643	192	557	1,278	30.4
1993	2,072	1,880	192	824	1,248	39.8
1994	2,127	1,922	205	877	1,250	41.2
1995	2,518	2,269	249	1,241	1,277	49.3
1996	2,567	2,357	210	1,311	1,256	51.1
1997	2,949	2,587	362	1,682	1,267	57.0
1998	2,793	2,483	310	1,611	1,182	57.8
	Natural Gas, Wet After Lease Separation (billion cubic feet at 14.73 psia and 60° Fahrenheit)					
Production						
1992	4,576	3,292	1,284	166	4,410	3.6
1993	4,651	3,383	1,268	229	4,422	4.9
1994	4,797	3,505	1,292	294	4,503	6.1
1995	4,679	3,421	1,258	354	4,315	7.8
1996	5,045	3,752	1,293	549	4,496	10.9
1997	5,230	3,984	1,246	577	4,653	11.0
1998	4,967	3,817	1,150	724	4,243	14.6
Reserves						
1992	27,050	20,006	7,044	3,273	23,777	12.1
1993	26,463	19,751	6,712	3,495	22,968	13.2
1994	27,626	21,208	6,418	4,772	22,854	17.3
1995	28,229	21,664	6,565	5,811	22,418	20.6
1996	28,153	22,119	6,034	6,389	21,764	22.7
1997	28,455	22,428	6,027	7,491	20,964	26.3
1998	26,937	21,261	5,676	7,575	19,362	28.1
	Natural Gas Liquids (million barrels of 42 U.S. gallons)					
Production						
1992	91	76	15	4	87	4.4
1993	97	80	17	6	91	6.2
1994	98	83	15	6	92	6.1
1995	85	71	14	12	73	14.1
1996	101	84	17	13	88	12.9
1997	140	123	17	17	123	12.1
1998	139	120	19	26	113	18.7
Reserves						
1992	590	472	118	91	499	15.4
1993	605	490	115	97	508	16.0
1994	603	500	103	110	493	18.2
1995	630	496	134	294	336	46.7
1996	753	621	132	300	453	39.8
1997	906	785	121	349	557	38.5
1998	919	776	143	387	532	42.1

[a]Includes Federal Offshore Alabama.
[b]Revisions result from reclassing all field depths to match Minerals Management Service assignments.
Source: Energy Information Administration, Office of Oil and Gas.

Table 9. U.S. Coalbed Methane Proved Reserves and Production, 1991-1998
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State	1991 Reserves	1991 Production	1992 Reserves	1992 Production	1993 Reserves	1993 Production	1994 Reserves	1994 Production
Alabama	1,714	68	1,968	89	1,237	103	976	108
Colorado	2,076	48	2,716	82	3,107	125	2,913	179
New Mexico	4,206	229	4,724	358	4,775	486	4,137	530
Others[a]	167	3	626	10	1,065	18	1,686	34
Total	**8,163**	**348**	**10,034**	**539**	**10,184**	**752**	**9,712**	**851**

State	1995 Reserves	1995 Production	1996 Reserves	1996 Production	1997 Reserves	1997 Production	1998 Reserves	1998 Production
Alabama	972	109	823	98	1,077	111	1,029	123
Colorado	3,461	226	3,711	274	3,890	312	4,211	401
New Mexico	4,299	574	4,180	575	4,351	597	4,232	571
Others[a]	1,767	47	1,852	56	2,144	70	2,707	99
Total	**10,499**	**956**	**10,566**	**1,003**	**11,462**	**1,090**	**12,179**	**1,194**

[a]Includes Kansas, Oklahoma, Pennsylvania, Utah, Virginia, West Virginia, and Wyoming.
Source: Energy Information Administration, Office of Oil and Gas.

Figure 1. U.S. Crude Oil Proved Reserves, 1988-1998

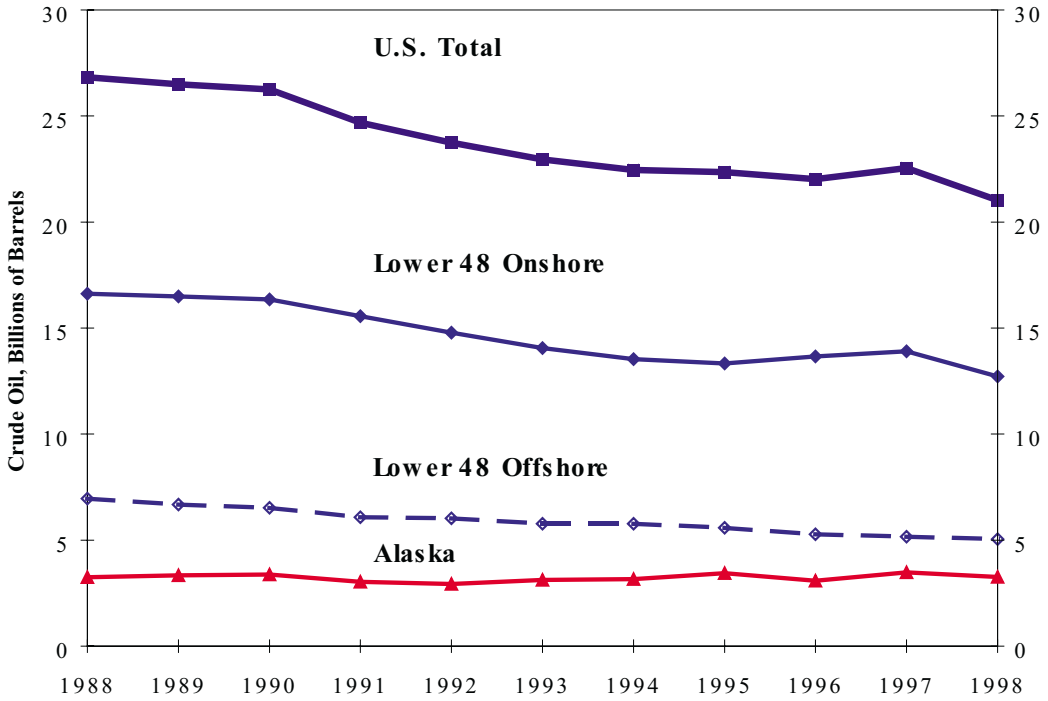
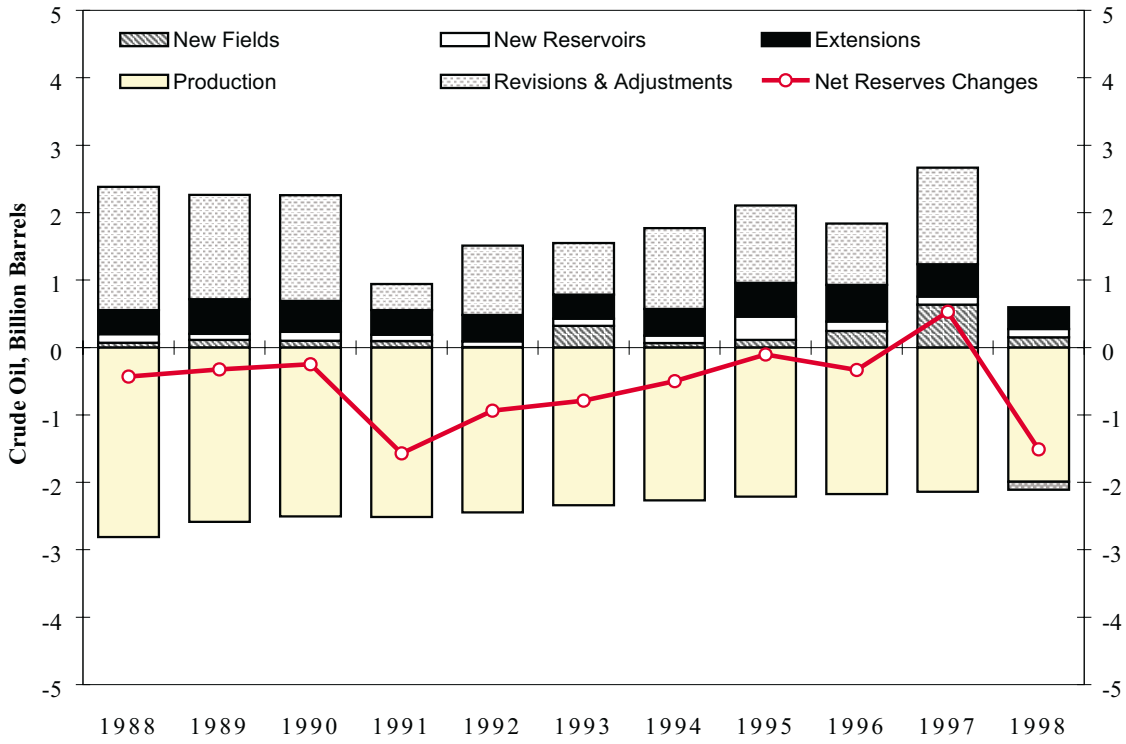


Figure 2. Components of Reserves Changes for Crude Oil, 1988-1998



Source: Energy Information Administration, Office of Oil and Gas.

Figure 3. U.S. Dry Natural Gas Proved Reserves, 1988-1998

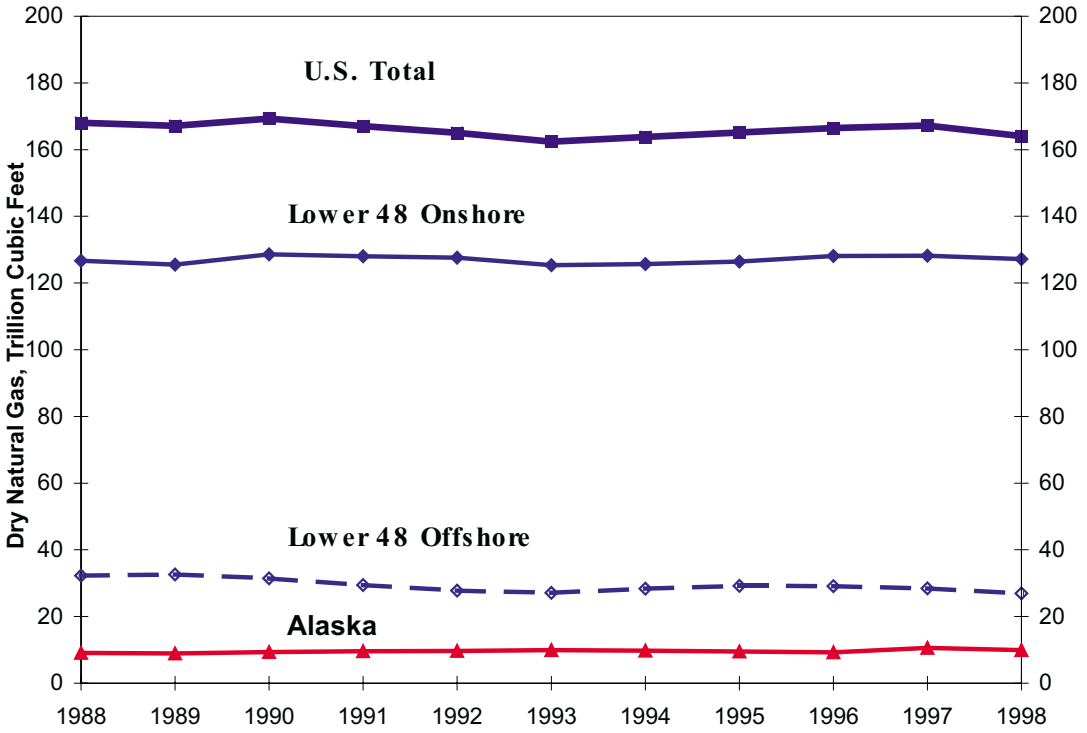
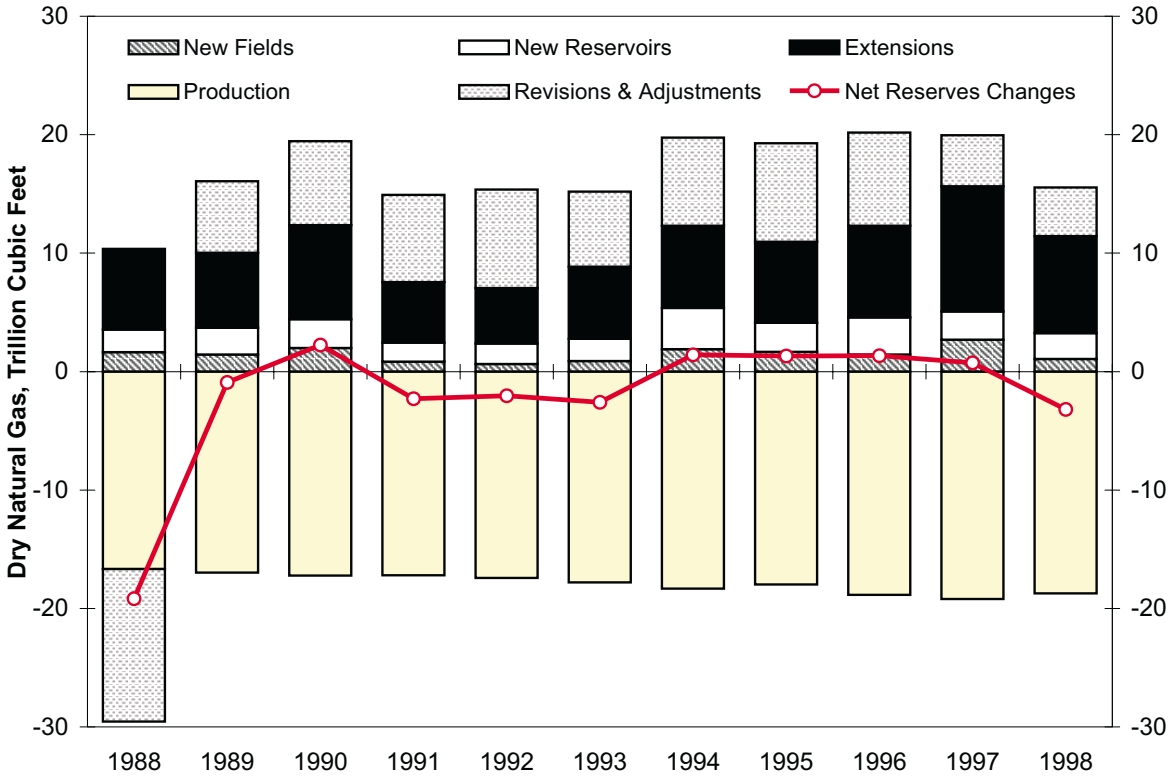


Figure 4. Components of Reserves Changes for Dry Natural Gas, 1988-1998



Source: Energy Information Administration, Office of Oil and Gas.

Figure 5. Crude Oil Production Replacement, 1998

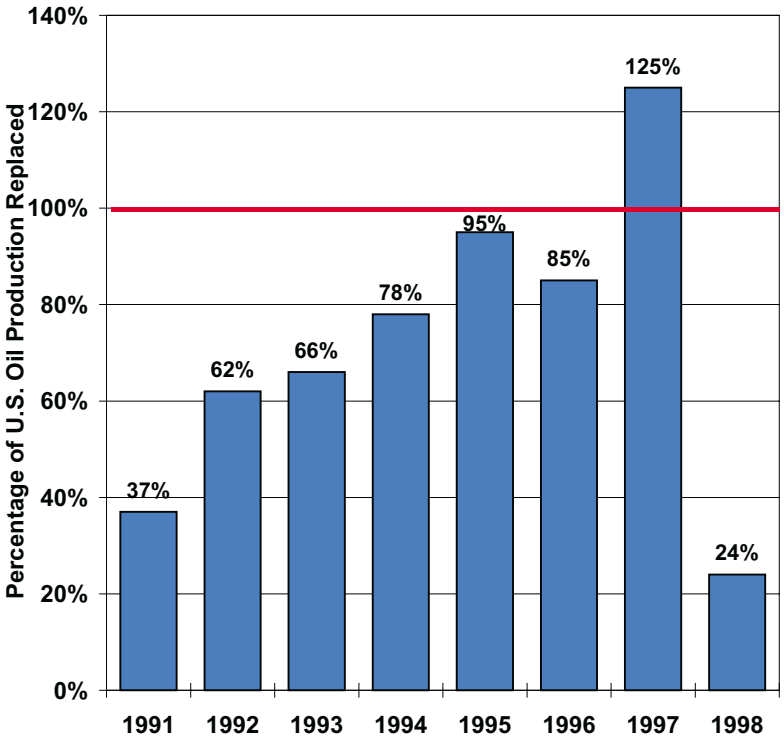
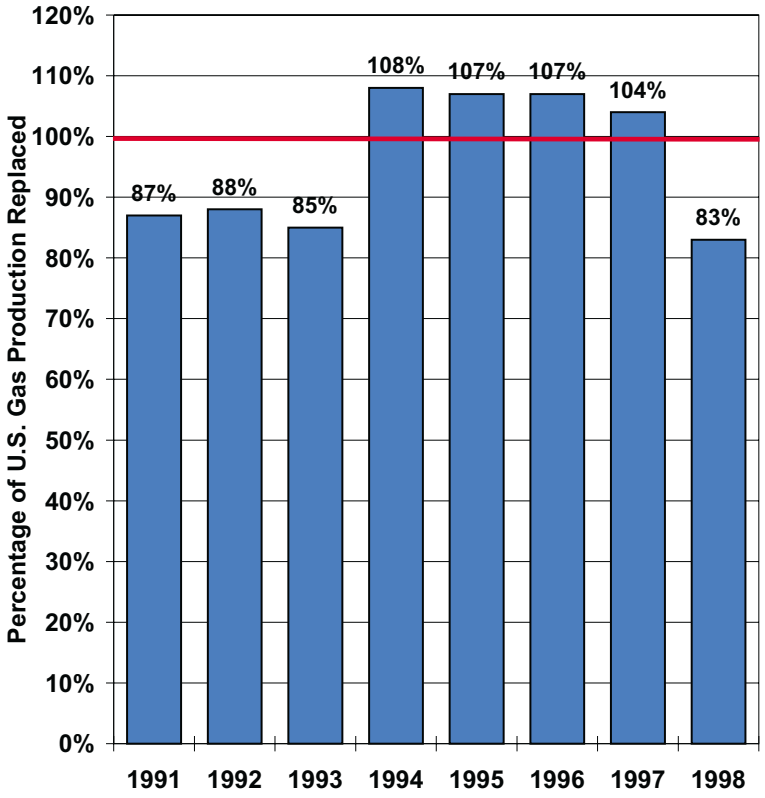


Figure 6. Dry Natural Gas Production Replacement, 1998



Source: Energy Information Administration, Office of Oil and Gas.

Figure 7. Changes in Crude Oil Proved Reserves by Area, 1997 to 1998

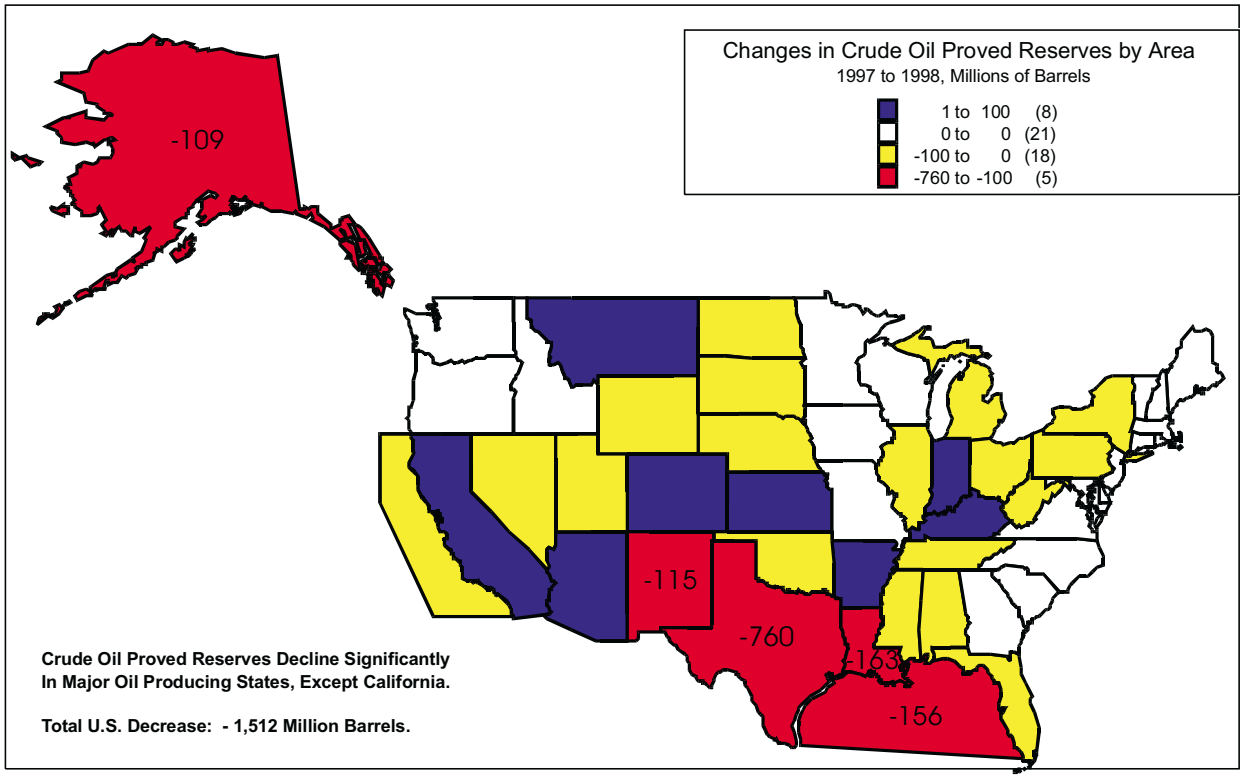
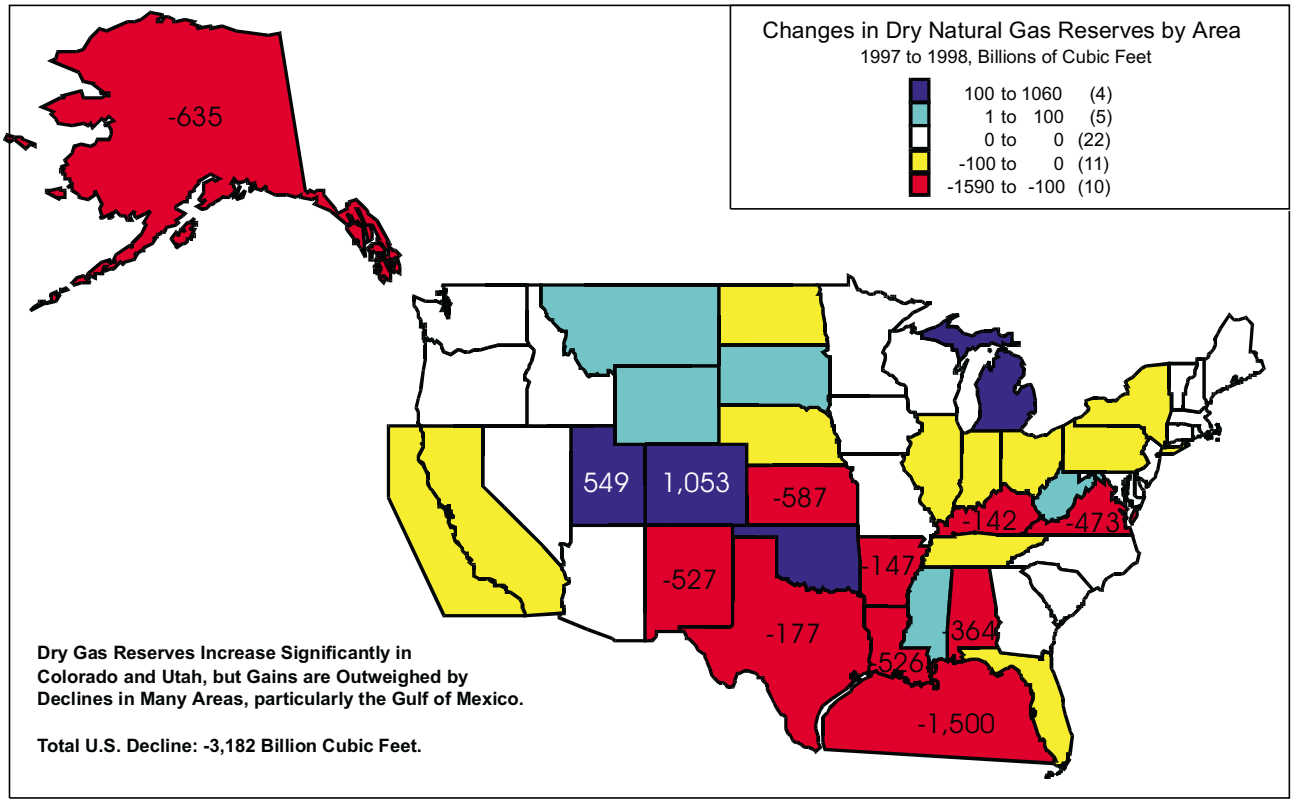


Figure 8. Changes in Dry Natural Gas Proved Reserves by Area, 1997 to 1998



Source: Energy Information Administration, Office of Oil and Gas.

Figure 9. Gulf of Mexico Shallow and Deepwater Oil Reserves

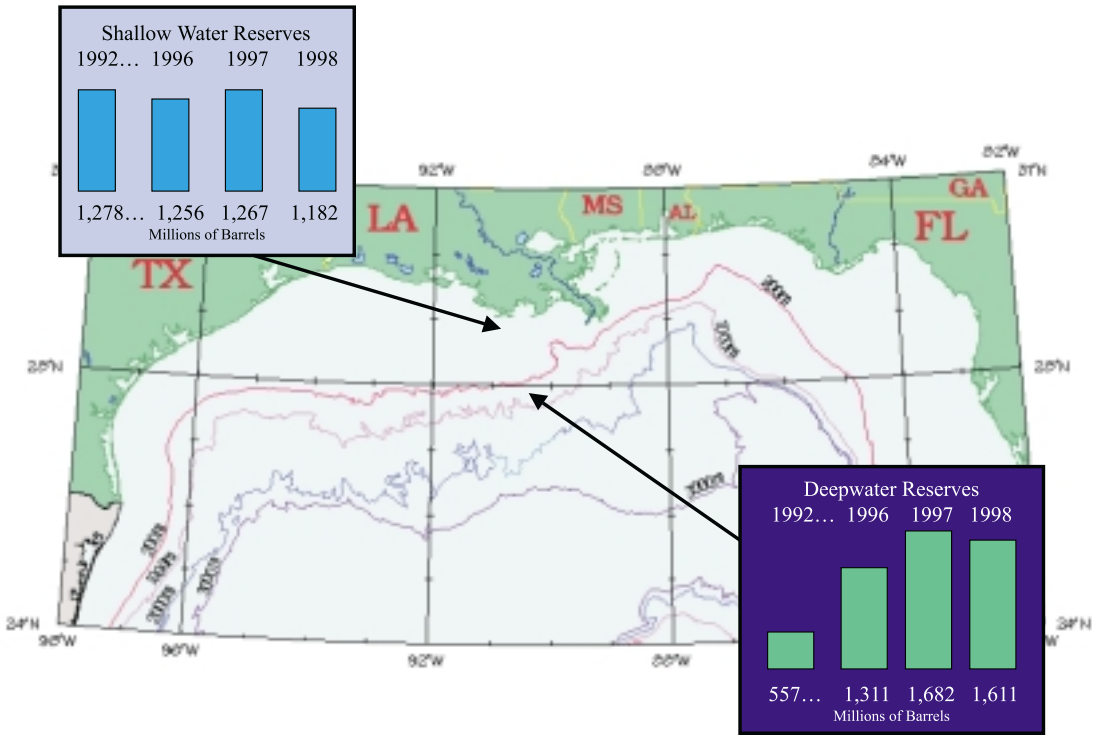


Figure 10. Gulf of Mexico Shallow and Deepwater Dry Natural Gas Proved Reserves

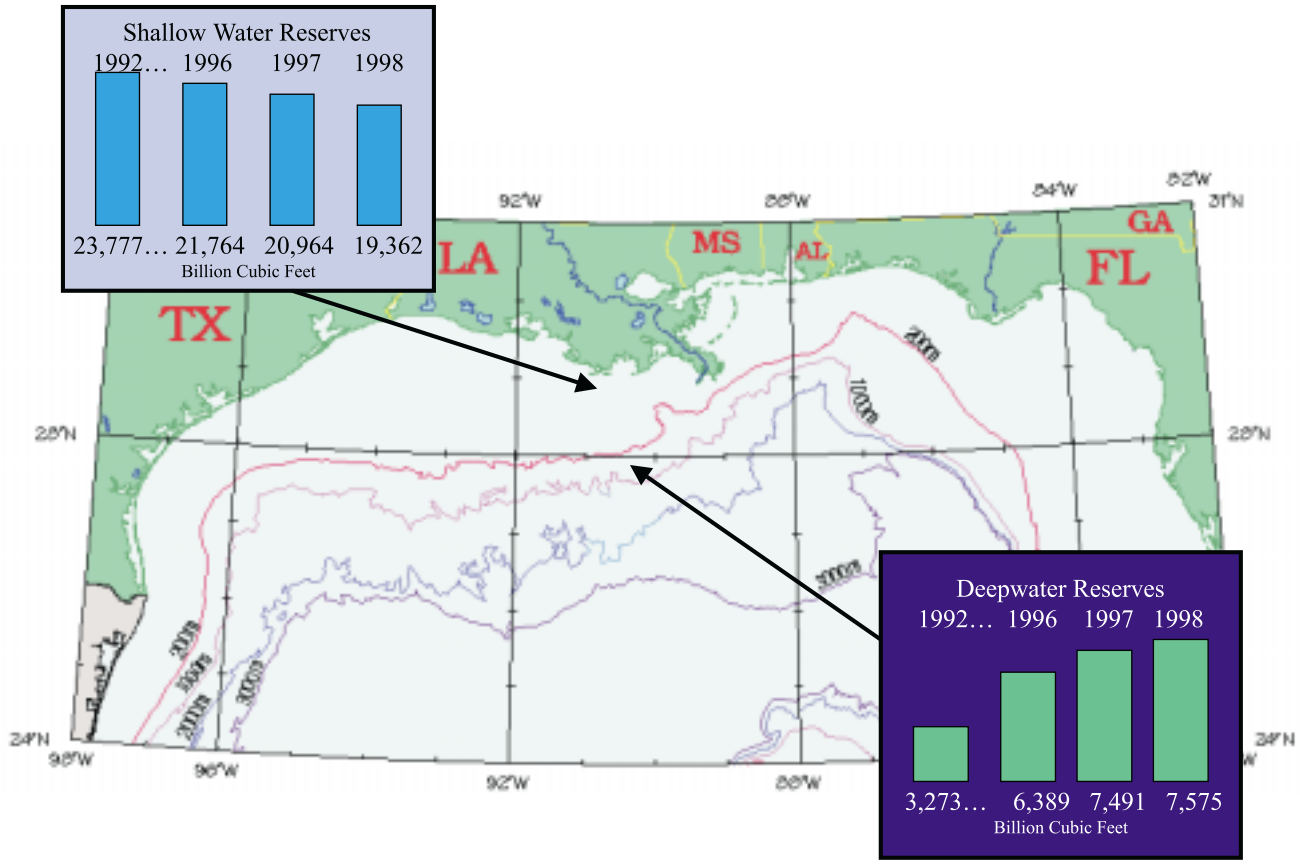
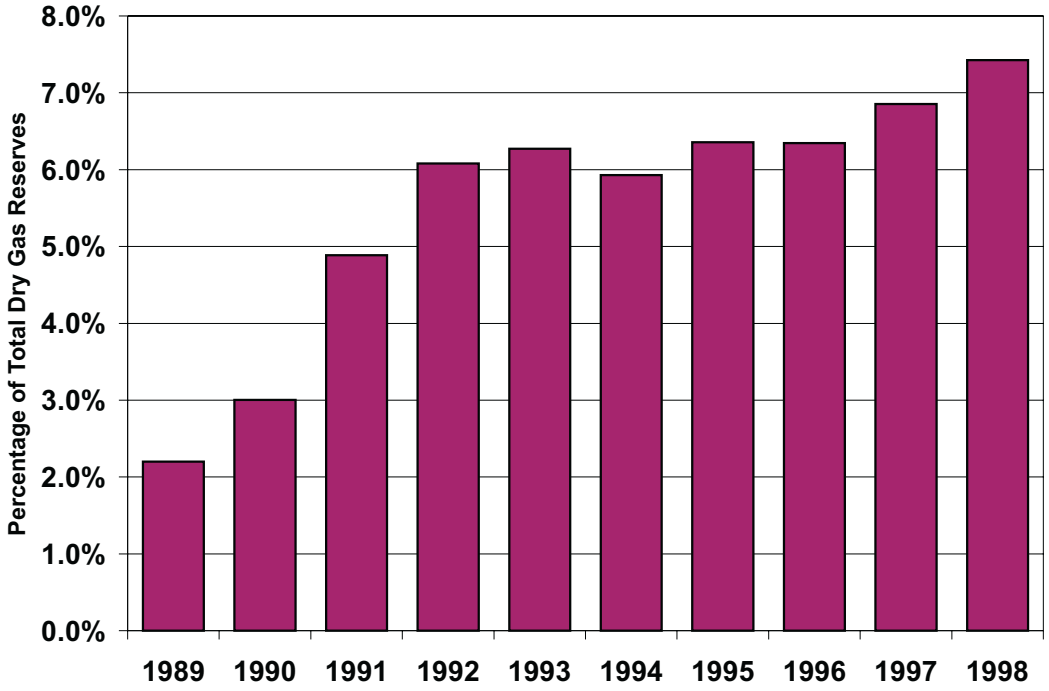


Figure 11. Coalbed Methane Percentage of U.S. Total Dry Gas Reserves



Source: Energy Information Administration, Office of Oil and Gas.

Figure 12. U.S. Natural Gas Liquids Proved Reserves, 1988-1998

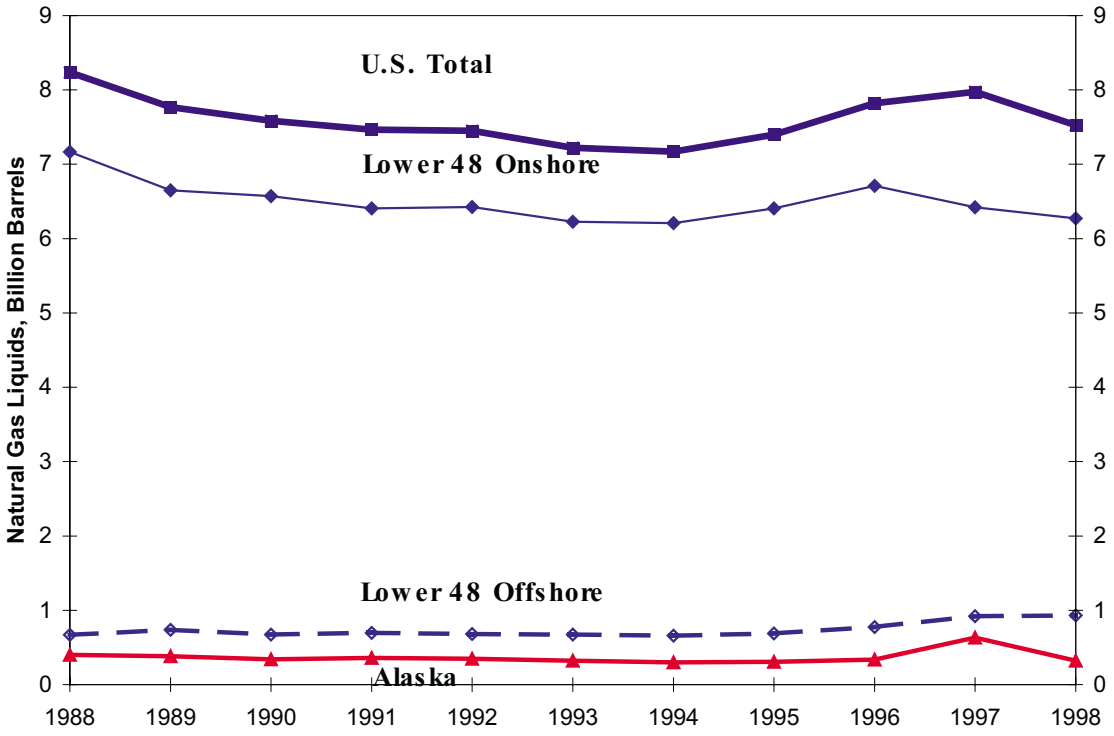
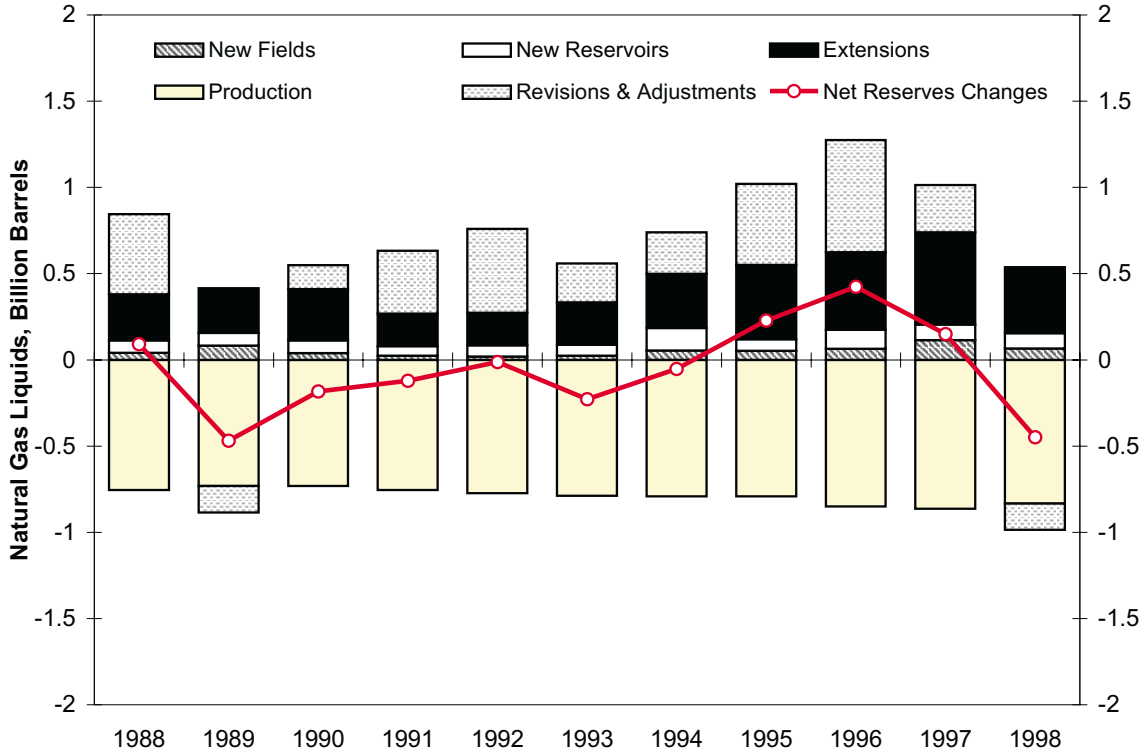


Figure 13. Components of Reserves Changes for Natural Gas Liquids, 1988-1998



Source: Energy Information Administration, Office of Oil and Gas.